49. MARASMIUS PRAEACUTUS ELLIS, BULL. TORR. BOT. CLUB. 1876.

Very minutely pulverulent. Pileus membranaceous, convex then explanate, sub-umbilicate, faintly sulcate-striate, white, the disk rufescent. Stipe stuffed then hollow, reddish-brown, the base whitish. Lamellae close, white, rather narrow, unequal, some of them forked, adnate.

Growing on dead trunks of Citrus and Alnus. Pileus 6-7 mm. in diameter, the stipe 2-3 cm. long.

50. MARASMIUS CANDIDUS FRIES. HYM. EUR. *Agaricus candidus.* BOLTON FUNG.

All white. Pileus submembranaceous, hemispheric then plane and depressed, pellucid, naked, at length sulcate-rugulose. Stipe stuffed, slender, incurved, slightly pruinose, at the base floccose and at length brownish. Lamellae adnexed, ventricose, distant, spores elliptic, 4 x 2 mic.

Growing on sticks, branches, needles of Pine, etc. Pileus 4-8 mm. in diameter, the stipe 6-10 mm. long and about 1 mm. thick.

51. MARASMIUS CONCINNUS E. & E. PROC. AC. NAT. SC. 1893.

Pileus convex, smoky-brown, pruinose. Stipe white, arising caespitosely from a white tomentum, below hairy-strigose, tapering upward and pruinose-pubescent. Lamellae not close, adnate, pruinose, the edge obtuse; spores globose, hyaline 3 mic. in diameter.

Growing on dead wood of Euonymus. A minute species; the pileus 1 mm. in diameter, the stipe 2 mm. long.

(To be continued.)

THE AMANITAS OF SWEDEN.

H. C. BEARDSLEE.

During the past summer it was the privilege of the writer to spend two months in the vicinity of Stockholm, studying the fungous flora of that region. The folloiwng notes are intended to outline some of the impressions of an American mycologist, gained from a study of the Amanitas with which Fries and his associates were familiar, with the hope that they may prove to be of interest to other American students of this genus, and serve as a slight contribution to a correct understanding of our own species.

The Amanitas which were observed included nine species, viz.: A. verna, muscaria, pantherina, spissa, rubescens, porphyria, mappa, strangulata, and vaginata. A. muscaria and rubescens and Amanitopsis vaginata need little comment.

AMANITA MUSCARIA.

A. muscaria, it may be said, was found occurring in two distinct forms. The common and typical form is much more brilliant than the plant commonly found in America. It is large and robust, with the pileus as much as ten inches in diameter, and is at first a brilliant red, not orange, with which the white warts of the pileus contrast finely. In this form it seemed to me the most striking and beautiful of the fungi observed. In Maine I have collected specimens with colors nearly as bright and stature fully as large, but for the most part our American plant seems to tend more to orange or yellow than to red, and is much less striking in appearance. The other Swedish form is very modest in its coloration, being umber or even gray, but differs in no other way from the type. The spores were as in our American plant.

AMANITA RUBESCENS.

A. rubescens Pers. was our familiar friend in color, stature, habit, and spores, and was as abundant as it is on Long Island, while Amanitopsis vaginata Bull. was identical with our plant and presented the same variations in color and stature.

AMANITA STRANGULATA AND VAGINATA.

Of the remaining species several were of great interest, and were observed with great care through the summer. The first of these to appear was A. strangulata Fr. I had felt very anxious to find this species, and as it happened, was well located to observe it, as one island in the Park at Drottningholm where we were located seemed to be a peculiarly favorable station, where it could be seen in large numbers throughout the summer. The status of this species has been doubtful to American students for several reasons. Fries himself, evidently did not have a clear conception of it when he wrote the first edition of his Epicrisis, for he placed it with A. solitaria, described it as having a thin pileus, a circumscissile free volva, and an entire distant annulus. He stated also that it is plainly analogous to A. verna, and that he had observed only one plant, growing on an ant hill. Later he seems to describe an entirely different plant, placing it in Amanitopsis and comparing it with A. vaginata, from which he makes it differ in its larger size, its warty pileus, and in the character of its volva and annulus. He gives also a very good figure in the main.

As we observed the plant it corresponds well to Fries' later description, and to his figure. At Drottingholm it is a very robust plant, easily exceeding all the other species in size. One specimen was observed which had the pileus 12 in. in diameter, the stipe nearly fourteen inches high and two inches thick. From these dimensions it varied all the way to the size of our forms of A. vaginata. In the park it was very conspicuous, the huge pilei,

held aloft above the grass, were visible for a considerable distance, making it easily the most striking of the fungi observed.

The doubt which has existed in the United States in regard to this species has rested largely upon three things. Fries' figure seems to indicate a stipe with a curious enlargement or in some cases two enlargements near the base. His references to a "false annulus" have been difficult to understand, and doubt has also existed in regard to the character of the spores.

Continued observation made it clear what was meant by both the figure and description.

In his description he speaks of its having a false annulus "resembling the false annulus of A. vaginata, but not like it enclosed in the volva." Those who have examined A. vaginata closely will be able to understand this reference. In this species the stipe is often clothed with a soft flocculose coat, and if such plants are examined in their early stages, just as the pileus is breaking through the volva, it will be found that within the volva there is a curious raised zone where the pileus clasped the stipe, reminding one somewhat of the annulus of Coprinus atramentarius. This seems to be particularly marked in rainy weather. This enlargement soon disappears and is not always to be found. Those who have observed this feature of A. vaginata will readily understand the meaning of Fries' figure and description. The enlargements figured at the base of the stipe in A. strangulata are not enlargements of the stipe proper, but are rather, poor representations of the "false annulus." They may be observed in A. strangulata at times, though seldom in the perfection of the figure. In fact they seem to be rather accidental, than essential. In the study of the American plant little weight need therefore be given to this particular feature of Fries' plant. The spores were found to be globose 12 x 14 mic. in diameter.

There seemed little doubt after continued study of the Swedish plant that the forms found by Peck in New York and by the writer in West Virginia and referred to A. strangulata Fr. have been correctly referred. The American plant seems to be less robust than its Swedish relatives, but it does not differ in any essential point.

Amanitopsis strangulata is certainly close to A. vaginata, but it seems to be sufficiently distinct to be entitled to recognition. It is at least better marked than many recognized species.

AMANITA SPISSA.

Amanita spissa Fr. is different from anything I have observed in America. It is much like A. rubescens in its stature and color, and has the pileus covered with the closely attached fragments of the volva, and the solid stipe somewhat marginate bulbous. Cooke's figure is fairly good. It does not have the characteristic

red stains of A. rubescens which at once distinguishes it from that species. The spores were found to be 10-12 by 7-8 mic.

AMANITA PORPHYRIA.

A. porphyria Fr. is close in appearance to forms of A. phalloides, and would be referred to that species unless closely examined. The annulus is however a peculiar sooty gray externally and in collapsing forms a fuliginous ring on the stipe which is the most characteristic mark of the species. It was found in dense pine woods, and was rather common.

AMANITA MAPPA.

A. mappa Fr. is a late species and was found but once, the last week in August. It is said to be more common late in the fall. It is identical with the American plant as it occurs at Asheville, so that no doubt need be entertained as to its occurrence with us. The stipe is strongly bulbous and the thick volva breaks in a regular circumscissile manner, leaving a thick sheath on the base of the bulb with a strongly marked margin much as in A. pantherina, and forming thick felty warts on the pileus. The plants observed were all pale lemon yellow. The spores were 9-11 mic. and globose in form. Karsten speaks of them as rough, and the roughness may easily be demonstrated with a good one-fifth inch objective. It is worth noting, however, that this feature is not confined to this one species, for although it does not seem to have been commonly noticed, several species of the Amanita have spores which are distinctly spinulose.

AMANITA PANTHERINA.

A. pantherina DC. was watched with a great deal of interest. It is very common at Drottningholm and, I am told, in Sweden generally. Its closest American relative is A. cothurnata, so well figured and described by Atkinson and so abundant in the Southern Appalachians. The typical Swedish plant is very distinct and is recognized at sight. The pileus is brown or gray and its surface contrasts finely with the white warts with which it is covered. The thick persistent sheath formed upon the base of the stipe by the basal portion of the volva makes it easy to recognize.

At first sight Amanita pantherina and A. cothurnata seem to be certainly distinct, but it must be confessed that with continued observation the validity of our American species seemed very doubtful. The points of difference as they are understood by Bresadola are the smaller size, white color and especially the different spores of A. cothurnata. The size of the two species does not impress one who has seen both species growing as being particularly different. The color is different, as our plant is pure white or nearly so in its typical form, which is not true of A. pantherina. It may be said, however, that pure white forms of A. pantherina were found at Drottningholm several times during the

summer, which had they occurred at Asheville would have been taken for A. cothurnata without hesitation. The main difference therefore would seem to be in the spores. These are described in A. cothurnata as being globose or nearly so, with a large, oil globule or nucleus which nearly fills the interior of the spore. The spores of A. pantherina are elliptical. What has been confidnetly referred to A. cothurnata is very abundant at Asheville. It is in perfect agreement with figure and description except in the spore characters. Numerous examinations have been made during the past four years giving always the same results — an elliptical spore similar in size and measurements to that of A. pantherina, without an oil globule of any size. In view of the perfect agreement in other respects the difference in spore characters has been a continual puzzle. Later, in examining anew herbarium specimens, it was found that in these the spores were exactly as described. They were globose or nearly so and the cell contents had almost entirely disappeared, their place being taken by a large globule which almost entirely filled the interior of the spore. In the Asheville plant therefore the spores in the fresh plant are in accord with those of A. pantherina and the points of difference are due to secondary changes.

This view would seem the more reasonable when one considers that the presence of a large oil globule to the exclusion of the proper cell contents is abnormal in a spore. A specimen of A. pantherina which was kept for several weeks in Sweden and examined at intervals showed also the same change in its spores. Whether such a change in the spores of herbarium specimens of the Agarics often takes place, and whether it always takes place in this species, I am unable to state.

In view of these facts it seems safe to suggest that A. cothurnata may well be considered a color form of A. pantherina. I believe that this will be accepted by those who examine living specimens of both forms. In this connection it may be of value to suggest also that our A. spreta is not distinct from A. cinerea Bres. Certain points of similarity led to this belief several years ago and it has been confirmed by Bresadola, to whom specimens and photographs of A. spreta have been sent. Bresadola's description does not cover all the forms in which this variable species occurs, nor does his figure well represent it. He states, however, in a letter that his plant is exactly shown in Atkinson's figure of A. spreta. In the southern mountains this species is very abundant. During the summer it may be found in profusion in our woods and groves, vieing in abundance with A. Caesarea, which is at times our commonest species. Pure white forms are not rare and in stature all conceivable variations may be found. Some compare well with Bresadola's figure, but for the greater part they are much more robust, the extreme forms being very unlike the form which he has considered the type.